

Claims:

What is claimed is:

- 5 1. A method of operating a data storage system comprising:
 monitoring operation of said data storage system;
 acquiring at least one parameter of said data storage system
 operation;
 accessing an optimal usage model for said data storage system that
10 reflects at least one component in said data storage system;
 comparing said at least one parameter acquired by monitoring
 operation of said data storage system with a predetermined value contained
 in said optimal usage model; and
 adjusting usage of said data storage system if said at least one
15 parameter is greater than or equal to said predetermined value.
2. The method of claim 1 wherein said step of adjusting usage of said data
 storage system comprises altering the size of a write cache.
- 20 3. The method of claim 1 wherein said step of adjusting usage of said data
 storage system comprises copying data from at least one data storage
 device to another data storage device in said data storage system and
 directing a portion of data requests from said at least one data storage
 device to said another data storage device.
- 25 4. The method of claim 1 wherein said step of adjusting usage of said data
 storage system comprises limiting the duration of continuous data access
 for at least one data storage device.
- 30 5. The method of claim 1 further comprising:
 determining if an adjustment event has occurred;
 identifying at least one storage system component;

placing said at least one data storage system component in a condition for diagnostic testing;

executing diagnostic computer program code that tests said at least one data storage system component;

5 acquiring at least one data storage component parameter from said diagnostic computer program code; and

adjusting said at least one data storage system component if said at least one data storage component parameter is greater than or equal to a predetermined value.

10

6. The method of claim 5 wherein said step of determining if an adjustment event has occurred comprises determining if a scheduling condition has been satisfied.

15

7. The method of claim 5 wherein said step of determining if an adjustment event has occurred comprises determining if an error has occurred.

8. The method of claim 5 wherein said step of placing said at least one data storage system component in a condition for testing further comprises saving user data from said at least one data storage component to another data storage component.

20

9. The method of claim 5 wherein said step of placing said at least one data storage system component in a condition for testing further comprises reconstructing user data from said at least one data storage component and saving said data to another data storage component.

25

10. The method of claim 5 wherein said step of adjusting said at least one data storage system component comprises adjusting write voltage.

30

11. The method of claim 5 wherein said step of adjusting said at least one data storage system component comprises remapping of sectors.

12. The method of claim 5 wherein said step of adjusting said at least one data storage system component comprises adjusting actuator acceleration.
13. The method of claim 5 wherein said step of adjusting said at least one data storage system component comprises adjusting read amplifier gain.
14. The method of claim 5 wherein said step of adjusting said at least one data storage system component comprises remapping component semiconductor memory.
15. The method of claim 5 wherein said step of executing diagnostic computer program code further comprises accessing computer program code across a network.
16. The method of claim 5 wherein said step of adjusting said at least one data storage system component further comprises accessing adjustment computer program code across a network.
17. The method of claim 16 further comprising decrypting said computer program code.
18. The method of claim 5 further comprising restoring user data to said at least one data storage system component.
19. A method of managing a data storage system comprising:
determining if an adjustment event has occurred;
identifying at least one storage system component;
placing said at least one data storage system component in a condition for diagnostic testing;
executing diagnostic computer program code that tests said at least one data storage system component;
acquiring at least one data storage component parameter from said diagnostic computer program code; and

adjusting said at least one data storage system component if said at least one data storage component parameter is greater than or equal to a predetermined value.

- 5 20. The method of claim 19 wherein said step of determining if an adjustment event has occurred comprises determining if a scheduling condition has been satisfied.
- 10 21. The method of claim 19 wherein said step of determining if an adjustment event has occurred comprises determining if an error has occurred.
- 15 22. The method of claim 19 wherein said step of placing said at least one data storage system component in a condition for testing further comprises saving user data from said at least one data storage component to another data storage component.
- 20 23. The method of claim 22 wherein said step of saving data further comprises storing said user data in a different format.
- 25 24. The method of claim 19 wherein said step of placing said at least one data storage system component in a condition for testing further comprises reconstructing user data from said at least one data storage component and saving said data to another data storage component.
- 30 25. The method of claim 19 wherein said step of adjusting said at least one data storage system component comprises adjusting write voltage.
26. The method of claim 19 wherein said step of adjusting said at least one data storage system component comprises remapping of sectors.
27. The method of claim 19 wherein said step of adjusting said at least one data storage system component comprises adjusting actuator acceleration.

28. The method of claim 19 wherein said step of adjusting said at least one data storage system component comprises adjusting read amplifier gain.
- 5 29. The method of claim 19 wherein said step of adjusting said at least one data storage system component comprises remapping component semiconductor memory.
- 10 30. The method of claim 19 wherein said step of executing diagnostic computer program code further comprises accessing computer program code across a network.
- 15 31. The method of claim 19 wherein said step of adjusting said at least one data storage system component further comprises accessing adjustment computer program code across a network.
32. The method of claim 31 further comprising decrypting said computer program code.
- 20 33. The method of claim 19 further comprising restoring user data to said at least one data storage system component.
- 25 34. A data storage system comprising:
a host system;
a storage controller;
a plurality of data storage devices;
a model of optimal usage for at least one data storage system component;
computer program code that acquires at least one operating parameter for said at least one data storage system component and that compares said at least one operating parameter with a predetermined value contained in said model of optimal usage and that adjusts usage of said data storage system if said at least one operating parameter is greater than or equal to said predetermined value.
- 30

35. A data storage system comprising:
- a host system;
 - a storage controller;
 - 5 a plurality of data storage devices;
 - scheduling computer program code that determines if at least one scheduling condition is met and initiates execution of diagnostic computer program code if said at least one scheduling condition is met;
 - 10 event detection computer program code that determines if at least one initiating event has occurred and that initiates execution of said diagnostic computer program code if said at least one initiating event has occurred; and
 - 15 computer program code that compares at least one component parameter value acquired by said diagnostic computer program code with a predetermined value and that performs an adjustment of a storage system component if said at least one component parameter is greater than or equal to said predetermined value.
36. The data storage system of claim 35 further comprising reliable data
20 organization computer program code that formats and stores user data stored on said data storage system in a fault tolerant manner.
37. The data storage system of claim 35 further comprising data recovery
25 computer program code that regenerates user data from at least one data storage device of said plurality of data storage devices if said user data is not accessible from said at least one data storage device.
38. The data storage system of claim 35 further comprising computer program
30 code that saves user data from at least one data storage device to at least one other data storage device prior to execution of said diagnostic computer program code.

39. The data storage system of claim 14 wherein said computer program code that performs an adjustment is accessed across a network.

40. A data storage system comprising:

5 host means;
 storage controller means;
 a plurality of data storage means;
 optimal usage model means;
 usage monitoring means that acquire at least one operating
10 parameter for said data storage system and that compare said at least one
 operating parameter with a predetermined value contained in said optimal
 usage model means; and
 system usage adjustment means that alter the usage of said system if
 said at least one operating parameter is greater than or equal to said
15 predetermined value.

41. A data storage system comprising:

 host means;
 storage controller means;
20 a plurality of data storage means;
 scheduling means that determine if at least one scheduling condition
 is met and initiates execution of diagnostic means if said scheduling
 condition is met.
 event detection means that determine if at least one initiating event
25 has occurred and that initiate said diagnostic means if said at least one
 initiating event has occurred;
 means that compare at least one component parameter value
 acquired by said diagnostic means with a predetermined value and that
 perform an adjustment of a storage system component if said at least one
30 operating parameter is greater than or equal to said predetermined value.